MATH 1271 SAMPLE MIDTERM I

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The midterm exam will cover the Sections 1.1 - 1.3, 1.6, 2.1 - 2.4.

1. Express the area of an equlateral triangle as a function of the length of a side.
2. Find the inverse functions of $f(x) = \sqrt{x^3 + 1}$ and $g(x) = \sqrt{x - 2} + 1$.
3. Find the limit, if it exists. If the limit does not exist, explain why.
   a) $\lim_{x \to -7} \dfrac{x + 7}{x^2 - 49}$
   b) $\lim_{x \to 0} \dfrac{sin(7x)}{sin(5x)}$
   c) $\lim_{x \to 1} (x - 1)^2 sin\left(\dfrac{2}{x - 1}\right)$
   d) $\lim_{x \to 0} \left(\dfrac{1}{x\sqrt{x + 1}} - \dfrac{1}{x}\right)$
   e) $\lim_{x \to -1} \dfrac{|x + 1|}{x + 1}$
   f) $\lim_{x \to -\infty} \dfrac{1}{x} sin\left(\dfrac{1}{x}\right)$
4. Find the vertical asymptotes of the function $f(x) = \dfrac{x - 3}{(x^2 - 9)(x + 4)}$
5. (a) State the ϵ - δ definition of a limit. (b) Use the defintion to show that $\lim_{x \to 2} x^3 = 8$.
6. (a) Represent function $h(x) = \sqrt{x^4 - x}$ as a composition of two functions f and g. (b) Provide the formula for the composition $f(g(x))$ of $f(x) = x^3 + x$ and $g(x) = sin(x)$.